

MULTIUSE EXPERT ELECTRICAL CALCULATOR SYSTEM

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“I hereby acknowledge that the scope and quality of this thesis is qualified for the
award of the Bachelor Degree of Electrical Engineering (Electronics)”

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This thesis is submitted as partial fulfillment of the requirements for the award of the
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*Specially dedicated to
My beloved family and those people who have guided and inspired me
throughout my journey of education*

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Thank you.

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ABSTRACT

With the technological demands of today, we must increase the number of individuals that successfully complete a degree in science and engineering. To accomplish this goal, the first obstacle to overcome is the year semester mathematical calculating course. It has historically been a graveyard for students in engineering and science. Multiuse Expert Electrical Calculator System designed as a system which has many functions and also user friendly. This system is an expert system because by using this system, we can show formula and also can analyze the calculation. Calculator technologies nowadays not widely use because we cannot get the analysis of the calculation after we get the result of calculation. Most of calculator cannot appear circuit that we want to calculate and need a lot of time to get an accurate result and make learning slower, difficult and not interesting. This system was designed by using Visual Basic Language and window based to produce the calculator system and for the learning purpose. Multiuse Expert Electrical Calculator System was covered certain calculation in electrical such as Basic Circuit in Electrical and Robotics. So, for all calculation, this system will show analysis to make users more understand about the circuit connection in a short time. In order to make this system become user friendly, the guidelines and more information about the topics will be inserted as a learning purpose. This system built not only for student but it can be used by lecturers, teachers, engineers and also non-technology person even they not familiar with electrical calculations. So, this system will make a user's find the accurate result faster, easy and more interesting.

ABSTRAK

Permintaan teknologi hari ini membuatkan bilangan individu-individu yang berjaya dalam bidang sains dan kejuruteraan mesti ditingkatkan. Untuk mencapai cita-cita ini, halangan yang pertama untuk menyelesaikan masalah ini adalah bidang pengiraan matematik. Secara sejarahnya, ia bagaikan perkuburan kepada pelajar-pelajar yang berada dalam bidang sains dan kejuruteraan. *Multiuse Expert Electrical Calculator System* dibuat sebagai satu sistem yang mempunyai pelbagai fungsi dan senang digunakan. Sistem ini dikatakan *expert* kerana ia boleh menunjukkan formula dan juga analisis untuk pengiraan. Teknologi kalkulator hari ini tidak digunakan secara meluas kerana kita tidak boleh mendapatkan analisis untuk setiap pengiraan selepas kita mendapat jawapan daripada pengiraan tersebut. Kebanyakan kalkulator juga tidak dapat memaparkan litar dan memerlukan masa yang panjang untuk mendapatkan jawapan yang tepat, serta membuatkan proses pembelajaran menjadi lambat, susah dan tidak menarik. Sistem ini dibina menggunakan *Visual Basic Language* dan *window based* untuk menghasilkan kalkulator sistem dan sebagai alat bantuan pembelajaran. *Multiuse Expert Electrical Calculator System* meliputi litar-litar asas dalam Elektrik dan Robot. Jadi, untuk semua pengiraan, sistem ini akan memaparkan analisis bagi memudahkan pengguna lebih memahami tentang sambungan litar dalam jangka masa yang pendek. Dalam proses menjadikan sistem ini mudah digunakan, panduan pengguna dan maklumat-maklumat yang berkaitan dengan tajuk disertakan. Sistem ini dibina bukan sahaja untuk pelajar, tetapi boleh juga digunakan oleh pensyarah, guru-guru, jurutera-jurutera dan orang-orang yang diluar bidang teknologi walaupun mereka tidak mahir dengan pengiraan elektrik. Jadi, sistem ini akan menjadikan pengguna lebih mudah mendapatkan jawapan yang lebih tepat dengan cepat, senang dan lebih menarik.

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LIST OF ABBREVIATIONS

SDLC	Software Development Life Cycle
GUI	Graphical User Interface
VB	Visual Basic
RAD	Rapid Application Development
AI	Artificial Intelligence
OOP	Object Oriented Programming

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

With the technological demands of today, we must increase the number of individuals that successfully complete a degree in science and engineering. To accomplish this goal, the first obstacle to overcome is the year semester mathematical calculating course. It has historically been a graveyard for students in engineering and science. This is even more pronounced for beginning high risk students. Calculator technologies nowadays not widely use because we cannot get the analysis after we get the result of calculation. Most of calculator cannot appear circuit that engineering students want to calculate and need a lot of time to get an accurate result. Hence, the process of learning more quick, easy and interesting.

When calculators were making their appearance on college campuses in the early **70s** they could not determine the bound of a function, could not evaluate a limit, could not plot a function, could not find the roots of a function, could not take the derivative of a function, or evaluate indefinite integrals [1]. It is true that a calculator was convenient when it came time to determine the value of a function, or any other number crunching activity, but the calculator really wasn't a major teaching or learning tool.

Do the calculators alone help students' learn? Or do they understand more of what they are learning? This project cannot provide definite answers to these questions. However, our findings do support those of others such as LaTorre, who states that: "The effective integration of the graphical and numerical solve features of the plotting calculator has been especially beneficial in helping students to establish for themselves important visual and numerical connections to the analytic presentations that are characteristic of most text books"[1]. It became obvious during our study that one thing the calculators do is provide immediate positive feedback for the student who is trying. Maybe this positive feeling of being able to solve calculus problems have more to do with the student success than anything else. If this is the case, then the calculator is doing more for calculus reform than anyone would have dreamed possible.

There is a direct correlation between success in the engineering area and a complete understanding of the basic mathematics principles. As the academic skills of the average scholar are honed, the relationship between these skills and the "world of engineering" becomes clearer to the engineering recruit. I believe that the course of calculus supplies the collegian with this necessary skill. I also believe, that if you provide proper placement along with supplying additional assistance to the students with the higher probability of failure, they can persist in engineering because of the skills they acquire in these courses. The use of plotting calculators within the computer program has shown to be very successful. We are taking individuals with a much lower incoming academic background, and allowing them to compete with individuals with a much higher incoming standard.

Multiuse Expert Electrical Calculator System designed as a system which has many functions and also user friendly. This system is an expert system because by using this system, we can show the analysis of the calculation. Beside that, this system also has the other function which the users can found terms in electrical field. This

system will be design by using Visual Basic Language and will be cover certain calculation in electrical such as Basic Circuit in Electrical.

So, for some calculation, this system will show graph to make users more understand about the circuit connection in a short time. This system built not only for student but it can be used by lecturers, teachers, engineers and also non-technology person even they not familiar with electrical calculations. So, this system was designed as a learning instrument because it also may show analysis for the calculation and give an accurate result. This system can display circuit to facilitate users to do calculations in a short time.

In order to make this system become user friendly, the guidelines and more information about the topics was inserted as a learning purpose. So, this system is built in window based for the Visual Basic Programming to produce the calculator system and to complete the requirements of all the learning purpose.

1.2 OBJECTIVES

The main objectives to produce this Multiuse Electrical Calculator System are as follows:

- To calculate the simple and complex equation in electrical field in a short time with accurate result
- To analyze and provide information about the circuit, according to the result by showing graph

1.3 SCOPES

In order to fulfill the main objectives, there are a few scopes as a guideline to fulfill the requirements of this Final Year Project:

1) Basics Laws: Ohms Law

2) Capacitors and Inductors: Series and Parallel Connection (two until five connections)

3) Three Phase Connection:

- I. Balanced Wye-Wye Connection
- II. Balanced Wye-Delta Connection
- III. Power in a Balanced System

4) Robotics: Inverse Kinematics

1.4 PROBLEM STATEMENTS

Calculator technologies nowadays not widely use in electrical field because we cannot get the other features except calculation. They also cannot show any figure such as graph after we get the result of calculation.

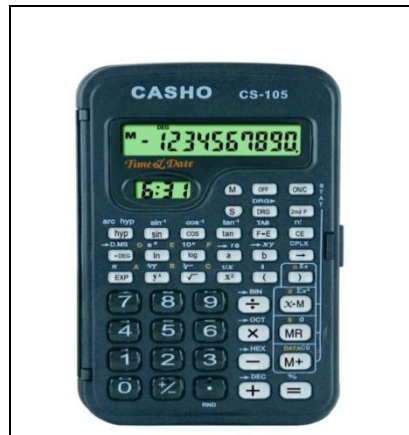


Figure 1.1: Example of Normal Electronic Scientific Calculator

Can this calculator produce circuit such as below?

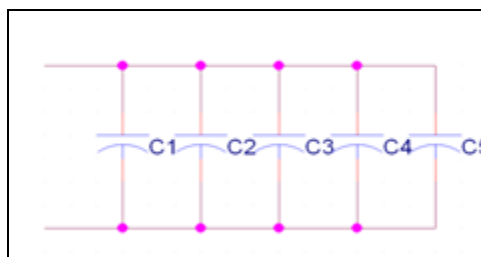


Figure 1.2: Five Parallel Capacitors Connection

As an engineering student, there are so many things to do and learn day by day and remembered all of them in a short period. But normal calculator only can do basic things and have limited function.

To success in education, student must learn more and more to get unlimited information. So, students must open books or something else to get the valuable information in order to get what they need in their studies. As we know normal electrical calculator cannot provide the information needed by the users and it is hard to user and takes time to get the valuable information. For an example, the basic calculations, ohm's law. The formula for this simple calculation is $V=IR$. When $V=8V$, and $R=3\Omega$, what the value for current, I ? The normal electrical calculator can appear the answer $I=V/R$ and the users must insert the value of the calculations, $8/3$. The answer will appear on the screen of the calculator: 2.666666667. So, the users can simplified the answer is 2.67A. But, to get the circuit for this calculation, users must opened books or something else to get the right circuit for this information. How can a user know if this answer wrong? How the users want to approve that and how can they get the right accurate and fast answer?

Most of calculator cannot appear circuit that we want to calculate and need a lot of time to get the accurate result. So the users of the normal calculator can only imagine the circuit and they do not know either it right or wrong. Instead of want to get the right result in the calculation, as a user, we also want to get more and more information about what we want to learn, but we cannot get the valuable things like that by using the normal calculator.

1.5 THESIS OUTLINE

Chapter 1 discuss on the background of the project, objectives, scope of the project, problem statement and also the thesis outline.

Chapter 2 focuses on literature reviews of this project based on journals and other references.

Chapter 3 explains the details of language that have been used in this project and the methods which used in order to finish this project.

Chapter 4 mainly discuss on the system design of the project. Details of the progress of the project are explained in this chapter.

Chapter 5 concludes overall about the project. Obstacle faces and future recommendation are also discussed in this chapter.

CHAPTER 2

LITERATURE REVIEW

2.1 CALCULATOR

A calculator is a device for performing mathematical calculations, distinguished from a computer generally by a limited problem domain and an interface optimized for interactive calculation rather than programming. Calculators can be hardware or software, and mechanical or electronic, and are often built into devices such as PDAs or mobile phones.

Modern electronic calculators are generally small (often pocket-sized) and usually inexpensive. In addition to general purpose calculators, there are those designed for specific markets; for example, there are scientific calculators which focus on advanced math like trigonometry and statistics. Modern calculators are more portable than most computers, though most PDA's are comparable in size to handheld calculators. [2]

2.2 ELECTRICAL CALCULATOR

Electrical Calculator that can quickly and easily calculate different electrical parameters. Automatic Calculations and Conversions with every unit and value changes. A must have utility for every pocket PC user. [3]

2.3 EXPERT SYSTEM

Expert system is a software system that incorporates concepts derived from experts in a field and uses their knowledge to provide problem analysis to users of the software.

The most common form of expert system is a computer program, with a set of rules, which analyzes information (usually supplied by the user of the system) about a specific class of problems, and recommends one or more courses of user action. The expert system may also provide mathematical analysis of the problems. The expert system utilizes what appears to be reasoning capabilities to reach conclusions.

A related term is wizard. A wizard is an interactive computer program that helps a user solves a problem. Originally the term wizard was used for programs that construct a database search query based on criteria supplied by the user. However, some rule-based expert systems are also called wizards. Other "Wizards" are a sequence of online forms that guide users through a series of choices, such as the ones which manage the installation of new software on computers, and these are not expert systems. [4]

An expert system is a computer program designed to simulate the problem-solving behavior of a human who is an expert in a narrow domain or discipline. An expert system is normally composed of a knowledge base (information, heuristics, etc.), inference engine (analyzes the knowledge base), and the end user interface (accepting inputs, generating outputs). The path that leads to the development of expert systems is

different from that of conventional programming techniques. The concepts for expert system development come from the subject domain of artificial intelligence (AI), and require a departure from conventional computing practices and programming techniques.

A conventional program consists of an algorithmic process to reach a specific result. An AI program is made up of a knowledge base and a procedure to infer an answer. Expert systems are capable of delivering quantitative information, much of which has been developed through basic and applied research (e.g. economic thresholds, crop development models, pest population models) as well as heuristics to interpret qualitatively derived values, or for use in lieu of quantitative information. Another feature is that these systems can address imprecise and incomplete data through the assignment of confidence values to inputs and conclusions. [5]

2.4 TYPES OF LANGUAGE

2.4.1 Visual Basic

This language was designed to be easy to learn and use. The language not only allows programmers to create simple many applications, but can also develop fairly complex applications as well.

Visual Basic (VB) is a third-generation event driven programming language and associated development environment from Microsoft for its computer programming model Visual Basic was derived from BASIC and enables the rapid application development (RAD) of graphical user interface (GUI) applications, access to databases and creation of ActiveX controls and objects. Scripting languages such as VBScript are syntactically similar to Visual Basic, but perform differently.

A programmer can put together an application using the components provided with Visual Basic itself. Programs written in Visual Basic can also use the windows application, but doing so requires external function declarations. [6]

VB has remained popular despite prior changes to the language. However, there may not have been as many viable alternatives as there are now. Today, other languages such as Java and C++ have become Web-development tools of choice. Developers may decide to use these languages because they are more mature and because VB.Net will be more complex to learn and use. Evans' North American Developer Survey didn't reveal a clear migratory path. However, the study found that the number of Java users increased 5 percent since last year's survey, while the portion of work time that developers used Java rose from 14 to 20 percent. Meanwhile, more than 15 percent of survey respondents—most of whom said they were VB users—indicated they will try Microsoft's soon-to-be-released C#.

Developers will also continue to use C and the object-oriented C++. However, Gartner's Driver said, "We believe 80 percent or more [of Web applications] will be based on either Java or Microsoft .NET products." Therefore, products such as Borland Software's Delphi and Sybase's PowerBuilder will have to fight for their share of the market's remaining 20 percent.[6]

Large companies may tend to use Java because the cross-platform technology provides better support for multiple environments and client devices than VB or VB.Net, according to Gartner. With the growing use of Java and Linux in servers, slightly more developers of Web applications for servers may adopt Java, said Dan Appleman, president of Desaware, which develops software products that work with VB and other Microsoft tools. Small companies may choose .NET technologies because they can be simpler and less expensive to use. However, Driver said, .NET will never compete head-to-head and feature-to-feature with Java until it works across platforms, which isn't planned for 12 to 18 months. [9]

2.4.2 Java

Java is an object-oriented programming language with syntax similar to C and C++, only simpler. Because Java is an interpreted language, the typical C or C++ compile-link-load-test-debug cycle is reduced. Java development environments actually let the entire software-development life cycle take place within a Web browser. Java applications are also arguably more robust than corresponding C or C++ applications, because the Java runtime system manages all memory. The same features that provide robustness also provide safety. Users are assured that applications are safe, even if downloaded over the Internet, because the Java runtime system has security mechanisms that protect against tampering. Finally, applications with concurrent threads run faster because Java has built-in support for multithreading. None of these are the primary reason there is so much interest in Java.

Rather, the main attraction is the fact that Java applications are completely portable. Write your code once and you never need to port or even recompile it. Rather than producing machine-specific instructions, the Java compiler produces vendor-neutral byte code. The Java runtime environment or virtual machine then translates the byte code into actual machine-specific instructions. The Java virtual machine (see the “Java virtual machine” sidebar) is installed on the user’s machine, either as part of a Web browser or as part of the underlying operating system. [7]

Gartner estimates that there are 2.5 million Java programmers in the world but fewer than a million with the skill and training to develop successful applications. Three of Java’s main advantages for Web development are its platform independence (particularly useful for servers, most of which are not Windows-based), maturity (reflected in such features as large standard libraries), and small footprint (useful in developing applications for smart cellular phones and handheld devices), said Sun spokesperson David Harrah. [8]

2.4.3 Microsoft's C#

C# is a new object-oriented programming language that combines C++'s memory flexibility and power with VB's programming ease and several of Java's features, such as its syntax, said Bixhorn. Some industry observers say C# is Microsoft's attempt to provide a Javalike language. C# is similar to Java in that it's object oriented and includes built-in garbage collection, which simplifies memory management.

C#, which Microsoft designed to work with its .NET platform, simplifies programming through its use of XML and SOAP. SOAP provides a way for programs running in different operating systems to communicate with one another by using HTTP and XML as information exchange mechanisms.

SOAP also gives developers access to a programming object or method without requiring them to write additional code for each step. Because this lets programmers build on existing code, proponents say C# will let vendors get new products and services to market more quickly and economically. [9]

C++ is a popular object-oriented programming (OOP) paradigm, which emphasizes high-level data abstraction (objects), and code reusability and maintenance. C++ provides great flexibility to help solve complex programming problems through techniques such as inheritance and polymorphism. Through these methods a "base" object can call functions of a "derived" object through the use of runtime-binding and virtual function tables.

Unfortunately, the cost of such flexibility is a penalty in performance. C++ programs have been known to run slower than programs written in a non-OOP language such as C. Driesen and Holzle showed the number of indirect calls increases because of runtime-binding of C++ programs. Radhakrishnan and John also showed that the execution speed of C++ programs is decreased as a result of branch misprediction.

2.4.4 Other languages

New versions of Borland's Delphi and Sybase's PowerBuilder are similar to VB in the way they work with Web objects and protocols, as well as their ease of use. In addition, like VB, they permit rapid application development via prebuilt objects, routines, and widgets—encapsulated in graphical icons—that users can drag and drop within a project window. With the recently released Delphi 6 and PowerBuilder 8, Borland and Sybase claim to have beaten Microsoft to the punch by offering the same support for Web services that .NET promises. Michael Swindell, Borland's director of product management, said the company also has released Kylix, a Delphicompatible development environment for native Linux Web applications. [8]

2.4.5 The Language Comparison

Microsoft's Bixhorn said, "The suggestion that VB developers are looking around for other opportunities is understandable. But VB.Net introduces a lot of new concepts, and we expect they'll continue to use VB." Gartner's Driver said VB.Net will become the dominant Web-development environment in part because it will be a key part of Microsoft's larger .NET platform. In fact, Desaware's Appleman said he expects the entire Visual Studio.Net to become important in the development marketplace. However, said Borland's Swindell, the goal of Web-application development will be to create remote procedure calls that are language and transport-independent. "More and more," he continued, "we're going to see application interoperability in which it doesn't matter what the application is built in. We'll be able to build C++ objects that integrate seamlessly with things written in Java or VB.Net or Delphi." In other words, he said, developers will be able to use whichever tool is best for the job. "What we're seeing is more and more development every year," Swindell said, "so what we'll continue to find is a more distributed use of all languages. Whereas VB dominated in the 1990s, we're [now] going to have a lot more Java, C and C++, Delphi, and other environments." [8]

2.5 SOFTWARE DEVELOPMENT LIFE CYCLE (SDLC)

Abstract-The classic waterfall model of software engineering is used throughout the production software development community. The escalating costs associated with software development and the unsatisfactory reliability, performance, and functionality of the resulting software have motivated software engineers to develop new alternate models of software development including prototyping, software synthesis, and reusable software. It is difficult to compare and contrast these new models of software development because their disciples often use different terminology, and the models often have little in common except their beginnings (marked by a recognition that a problem exists) and ends (marked by the existence of a software solution).

This project provides a framework which can serve

- 1) As a basis for analyzing the similarities and differences among alternate life cycle models
- 2) As a tool for software engineering researchers to help describe the probable impacts of a new life cycle model
- 3) As a means to help software practitioners decide on an appropriate life cycle model to utilize on a particular project or in a particular application area.

The use of such a model

- I. Encourages one to specify what the system is supposed to do (i.e., to define the requirements) before building the system (i.e., designing)
- II. Encourages one to plan how components are going to interact (i.e., designing) before building the components (i.e., coding)
- III. Enables project managers to track progress more accurately and to uncover possible slippages early
- IV. Demands that the development process generate a series of documents which can later be utilized to test and maintain the system
- V. Reduces development and maintenance costs due to all of the above reasons
- VI. Enables the organization that will develop the system to be more structured and manageable.[9]

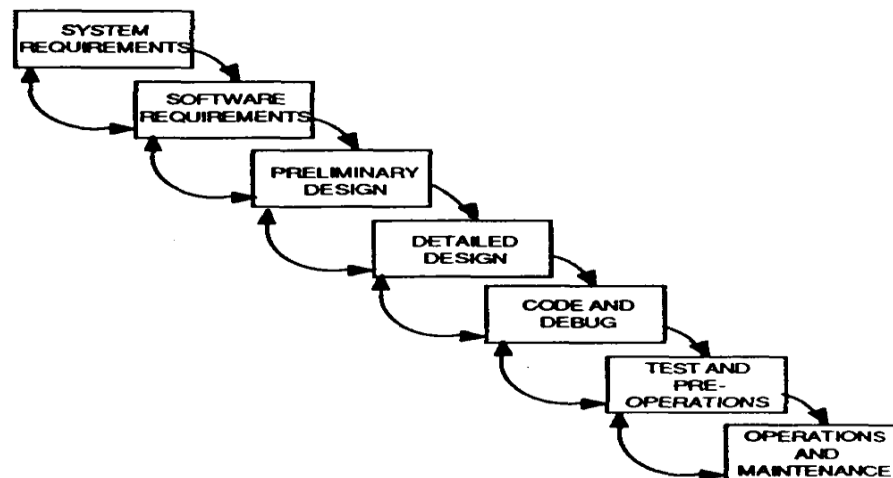


Figure 2.1: The waterfall model of software development

2.6 WEB AND WINDOWS BASED

Innovations are great, but there are so many coming at us so fast that it's hard for customers to stay on top of them all. This is especially true where innovations overlap between technologies.

Take the examples of a web-based vs. a windows-based approach to a user interface. The Web approach has almost no deployment issues, and is well-accepted. On the downside, it lags behind a Windows interface in terms of functionality richness, and is also somewhat slower to work with. And may have certain security issues for external use.

The Windows approach to a user interface is available to almost every user, is very fast, and comes with a very rich set of features. But the Windows approach requires deployment to each user – although Microsoft .NET's No-touch deployment is making this almost as easy as the Web approach.

Now for certain applications, the Web approach is a no-brainer – like booking plane tickets, or reserving a hotel room. But what about for a full-blown application like Microsoft Word or Excel? Are these better delivered in a Web or Windows client? Right now, it looks like the Web approach is getting better every day from a usability point of view, but yet Windows client deployment is also getting easier every day – especially with Microsoft and their .NET V2 Click Once technology behind it. [10]

Window Based	Web Based
Available to almost every user	No deployment issues, and is well-accepted
Very fast, and comes with a very rich set of features	Functionality richness, and is also somewhat slower to work with
No external security issue	Security issues for external use such as viruses
Easier in term of use	Have many functions, and sometimes it hard to follow

Table 2.1: Window based verses web based

CHAPTER 3

METHODOLOGY

3.1 VISUAL BASIC LANGUAGE

This system was designed by using Visual Basic Language. This is a fairly crude approximation of popularity, however, it's worth including, because all other things being equal, the more popular a language is, the more pages will exist mentioning it.

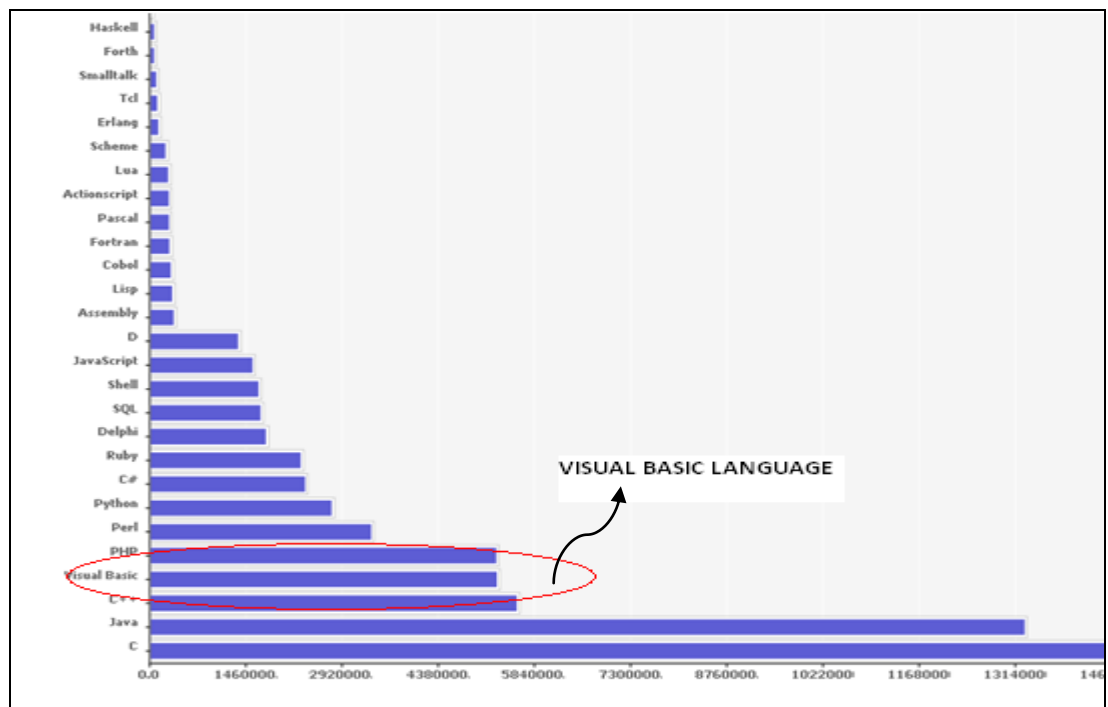


Figure 3.1: Popularity of Programming Language Usage (Last data update: *Sat Aug 02*

10:33:17 +0200 2008)

Visual Basic Programming Language is the most popular language which use in electrical field and it also one of the subjects that teach in the Engineering Laboratory for Electrical Engineering Student. Multiuse Expert Electrical Calculator System was developed by using Visual Basic Language because it is easy to learn and use. The language not only allows programmers to create simple many applications, but can also develop fairly complex applications as well.

3.2 SOFTWARE DEVELOPMENT LIFE CYCLE (SDLC)

By using Software Development Life Cycle (SDLC), this project was designed step by step until the objectives of this project achieve and success until it completely finish. All of related data will be collected to produce a good calculator system. Module of this system will be design first and then will be completed by all of the SDLC flow in order to get the results of calculations.



Figure 3.2: Software Development Life Cycle (SDLC)

Below are steps that used in order to build this system:

Step 1: Program Specification

First of all, the problem must be understanding and then get the solution to solve the problem. So, to get the inputs to solve the problem, some researching in literature review must be doing and detect if any formula or condition that must be use. This step makes us know the guides in order to get the best solution to settle any problems occur. So, this project can be upgraded time by time to produce a good system and make it become user friendly.

To understanding what the problem, I am doing researches in journals, webs and also interview some of Electronic and Electrical Engineering student. From all of the resources, I conclude that new systems for the calculator are very needed to solve complex calculation and to calculate in circuit form. So, I choose to use Visual Basic Language to produce a window based program, and to solve these problems.

Step 2: Program Design

In order to create this calculator system, a solution plan was designed to make the creating process more soft and manageable. Design of the circuit must be done by using P-Spice application to make the neat and good picture of circuits. The circuit design appearance must be clear and user friendly in order to make the calculator systems become more interesting and easy to use. This step is very important to produce a good system and save user's time.

So, to design this electrical calculator, flowchart was designed. To design the flowchart, all of the process which is related to build this calculator software must be considered. In this case, Software Development Life Cycle is

use in order to make this calculator making process easier and fluent. Besides that, story board was designed to facilitate the creation of this electrical calculator software step by step such as in figure 3.2.

Step 3: Program Code

To make sure this system able to operate softly, many coding about Visual Basic Language must be learned and have knowledge how to utilize it into various calculator functions. Some researches are done and learned from lecturers to get the right coding. For an example, the coding for this formula;

$$1/C_{eq} = 1/C_1 + 1/C_2$$

By using Visual Basic Programming, the above formula can be defined by this code:

```
a = TextBox1.Text  
b = TextBox2.Text  
  
c = 1 / ((1 / a) + (1 / b))  
TextBox3.Text = c
```

Step 4: Program Test

After finish the coding process, the program can be debugging to test either the program can be run or not. In order to finish the electrical calculator coding, there may many errors occur. So, the coding must be changed to get the output that want to show in this calculator. By searching and learning the right coding for this system, the best coding will be use and at the same time, avoid the errors occur during the programming process until this system operate softly and ready to use.

Step 5: Program Documentation

This software will be finished after the descriptions and all procedures that have been used were written into a thesis. So, in order to fulfill the requirement of this software, all of the coding must be generate into description, why and how its works. Beside that, in order to make this software become user friendly, the user guide or manual must be inserted into the program documentation.

3.3 WINDOW BASED INTERFACE

The Web approach has almost no deployment issues, and is well-accepted. On the downside, it lags behind a Windows interface in terms of functionality richness, and is also somewhat slower to work with. And may have certain security issues for external use. The Windows approach to a user interface is available to almost every user, is very fast, and comes with a very rich set of features. But the Windows approach requires deployment to each user – although Microsoft .NET's No-touch deployment is making this almost as easy as the Window approach. In order to finish this Calculator System, Window Based approach was used.